2005

41st Gregynog Statistical Conference
Programme

The talks will take place in Seminar Room 1 (2nd Floor, far end).

Friday	16.00	*Tea*
15 April	17.30	Prof Russell Cheng University of Southampton
		Analysis of Distributions in Simulation Factorial Experiments
	19.00	*Dinner*
	20.00	Profs Michael Cain and Stuart McLeay UW Bangor
		Journal Quality and Research Ratings: Maximum Likelihood Estimation based on the results of the 2001 RAE
Saturday	08.00	*Breakfast*
16 April	09.30	Dr Anton Merlushkin Credit Suisse First Boston
		Current problems in the modelling of interest rate derivatives
	11.00	*Coffee*
	11.30	Prof Qiwei Yao London School of Economics
		Statistical Analysis of Canadian Mink-Muskrat Data
	13.00	*Lunch*
		Afternoon free
	16.00	*Tea*
	17.00	Prof Bruce Ankenman Northwestern University, Chicago *visiting* Southampton
		Controlled Screening for Simulation Experiments
	18.30	*Dinner*
	19.30	*(Optional)* Concert in the Music Room (tickets £10)
Sunday	08.00	*Breakfast*
17 April	09.30	Prof Simon Thompson MRC Biostatistics Unit, Cambridge
		Building a model to evaluate the cost-effectiveness of screening for aortic aneurysms
	11.00	*Coffee*
	11.30	Prof Mike Kenward London School of Tropical Hygiene and Medicine
		Multiple Imputation for Longitudinal/Hierarchical Data
	13.00	*Lunch*
	14.00	Prof David Firth University of Warwick
		Working with over-parameterized models
	15.15	*Tea and finish*

[ILL - FLU UNABLE TO ATTEND]

Speakers

Prof Bruce Ankenman	Northwestern University, Chicago *visiting* Southampton
Prof Michael Cain	University of Wales, Bangor
Prof Russell Cheng	University of Southampton
Prof David Firth	University of Warwick
~~Prof Mike Kenward~~	~~London School of Tropical Hygiene and Medicine~~ (ILL)
Prof Stuart McLeay	University of Wales, Bangor
Dr Anton Merlushkin	Credit Suisse First Boston
Prof Simon Thompson	MRC Biostatistics Unit, Cambridge
Prof Qiwei Yao	London School of Economics

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Prof Peter Jones

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Dr Mark Kelbert
Dr Alan Watkins
Prof Alan Hawkes

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Prof Jane Hutton
Dr Miguel Juarez-Hermosillo

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Paul Malley
Christopher Howitt
Katherine Boyd
Maria Vazquez Montes
Hugo Maruri-Aguilar
Erick Lekone
Maria Costa
Beatriz Penaloza
Andrei Bejan
Charalambos Charalambous
Dignora Stavrinidou
Demetris Lamnisos
Chen Ji
Xiaozhen Hu
Kylie Lo
Kwangho Choi
Guy Freeman
Alex Alexogiannopoulos

Abstracts

Working with over-parameterized models

Prof David Firth, University of Warwick

A parametric representation of a statistical model may involve some redundancy; that is, the mapping from parameter space to family of distributions may be many-to-one. Such over-parameterized representations are often very useful conceptually, but can cause computational and inferential problems (ridges in the likelihood, non-estimable parameter combinations). For linear and generalized-linear models, well-known approaches use either a reduced basis or a generalized matrix inverse.
In this talk I will discuss how to work with over-parameterized nonlinear models. Aspects covered will include maximum-likelihood computation, detection of non-identifiability, and presentation of results. Some implications for Bayesian analysis will also be touched upon. The work is motivated by the design of an R package to specify and fit general regression models involving multiplicative interaction terms; these include the (G)AMMI models that are used for example in crop science to represent genotype-by-environment effects, as well as various models for categorical data in social research.

Analysis of Distributions in Simulation Factorial Experiments

Prof Russell Cheng, University of Southampton

The output from simulation factorial experiments can be complex and may not be amenable to standard methods of estimation like ANOVA. We consider the situation where the simulation output may not satisfy normality or homoscedasticity assumptions and where differences in output at different factor combinations are not simply differences in means. We show that some well-known goodness of fit statistics can be generalised to provide a simple analysis that is similar to ANOVA but which is more sensitive. We describe its properties. An advantage is that, whatever the sample size, Monte-Carlo sampling can be used to directly generate arbitrarily accurate critical test null values in online analysis.

The method is illustrated with an example based on consultancy work for National Air Traffic Services in real time simulation trials investigating changes in procedures used by air traffic controllers overseeing flights over Britain.

Statistical Analysis of Canadian Mink-Muskrat Data

Prof Qiwei Yao, London School of Economics

Abstract: Following Elton's (1924) pioneering work, one of the key issues in ecology has been to understand the mechanisms underlying the periodic population fluctuations. Here we analyse the annual numbers of muskrats and minks caught over 81 trapping regions in Canada for a period of 25years. The analysis reinforces the view that the food chain interaction between mink (predator) and muskrat (prey) is one of the driving forces for the population fluctuations. We review the three sets of statistical techniques involved in the analysis: (i) the grouping of trapping regions via bootstrapping, (ii) parametric modelling for pooled data and their skeletons, and (iii) varying-coefficient linear modelling and spatial smoothing.

Building a model to evaluate the cost-effectiveness of screening for aortic aneurysms

Prof Simon Thompson, MRC Biostatistics Unit, Cambridge

Abdominal aortic aneurysm (AAA) rupture causes 3% of all deaths in men aged over 65. However AAAs can be detected early by ultrasound screening, and surgical repair undertaken. Whether to implement a national UK policy for screening men is currently under discussion. The evidence on the benefits of AAA screening comes from four large randomised trials. Only one of the trials assessed cost-effectiveness, and this was limited to the short-term. Long-term cost-effectiveness has been investigated in number of economic decision models, but with very heterogeneous results.

Focusing on the statistical issues that arise, I review the evidence from the randomised trials, the inadequacy of both the available short-term cost-effectiveness analysis and the existing long-term cost-effectiveness models. I describe the building of a more reliable decision model for AAA screening, the estimation of the parameters involved, the model's internal validation against existing data, and its longer-term extrapolation.

There are many difficult issues that arise with such models, including handling of model structure uncertainty as well as parameter uncertainty, and the dangers in long-term extrapolation. However it is these types of model that currently underpin decisions on the NHS provision of medical interventions.

Controlled Screening for Simulation Experiments

Prof Bruce Ankenman, Northwestern University, Chicago *visiting* Southampton.

The topic that I propose to discuss is Controlled Screening for Simulation Experiments. "Controlled" for my purposes means that the user specifies the power and type I error and the method guarantees these under certain assumptions. "Screening" in my context means searching through a large number of factors (30-500) to find the ones with large effects on the response. Finally, "Simulation Experiments" applies primarily to discrete-event simulations typically of manufacturing systems or service operations, but it could be expanded to include any experiment that is run on a computer simulation that involves some random error. The methods that are proposed are generally assumed to be directed by the computer and thus to run automatically until all factors are classified as either important or unimportant.